

ILLEGIB

Approved For Release 2001/05/17 : CIA-RDP78T05439A000200220011-7

Next 1 Page(s) In Document Exempt

Approved For Release 2001/05/17 : CIA-RDP78T05439A000200220011-7

S-8 2 36

TABLE OF CONTENTS

<u>Item</u>		<u>Page</u>
1	The 5-3-3-5 and 9-5-5-9 Antennas at Komsomolsk, Khabarovsk, Tashkent and Tyura Tam.....	1



Declassification Review by NIMA/DoD

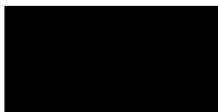
25X2

TOP SECRET — EIDER — CHESS

SC-00436-58

1. The 5-3-3-5 and 9-5-5-9 Antennas at Komsomolsk, Khabarovsk, Tashkent and Tyura Tam:

25X1D



TALENT photography has revealed large communications facilities at Khabarovsk, Tashkent, Tyura Tam

TOP SECRET CHESS and Komsomolsk. These communication installations have antenna farms which include the usual rhombic antennas plus unusual configurations of poles in a rectangular layout. For convenience these rectangular arrangements are called 5-3-3-5 and 9-5-5-9 thus describing the numbers of poles in each row as shown in Fig. 1.

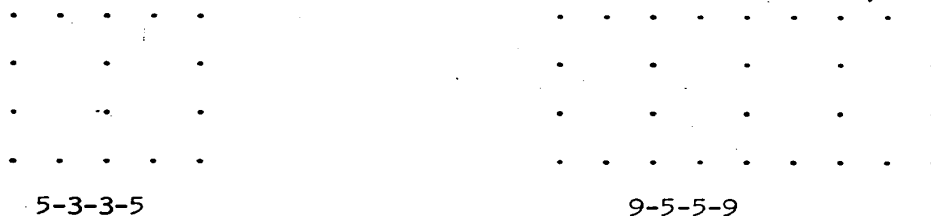


Fig. 1.

While these antennas evidently are used for high-frequency radio communications, their characteristics were not recognized immediately. A subsequent survey of technical literature of both the USSR and the US has revealed that these pole configurations (5-3-3-5 and 9-5-5-9) are identical with the supporting structure of a form of travelling wave antennas called "fishbone" in technical literature. The advantage of this type of antenna is that it permits efficient, high-frequency operation employing short

TOP SECRET — EIDER — CHESS

SC-00436-58

poles and requiring a minimum of land without sacrificing antenna gain or band-width. Furthermore, since the antenna system uses short poles the cost of the installation is moderate.

Several references to American work on this antenna were found, the earliest being a paper by Beverage and Peterson in the April 1931 Proceedings of the IRE. A photograph of a two-bay fishbone antenna (5-3-3-5 pattern) at the [REDACTED] 25X1A Radio Antenna Engineering by Laport. A photograph of a model of the two-bay fishbone antenna appears in Vestnik Svyazi, December, 1955. Ground 25X1C photography was obtained [REDACTED] of the two-bay antenna system near Leningrad. Although photographs were not found in the open literature of a four-bay "fishbone" antenna, a schematic diagram was found in which the method of connecting the four bays to the transmission line is detailed. The four-bay "fishbone" antenna (9-5-5-9 pattern) is two two-bay antennas operating in parallel as shown in Fig. 2.

Study of communications facilities revealed by TALENT photography is continuing and a more comprehensive technical paper dealing with the observed antenna systems will be published in the near future. (TOP SECRET CHESS)

TOP SECRET — EIDER — CHESS

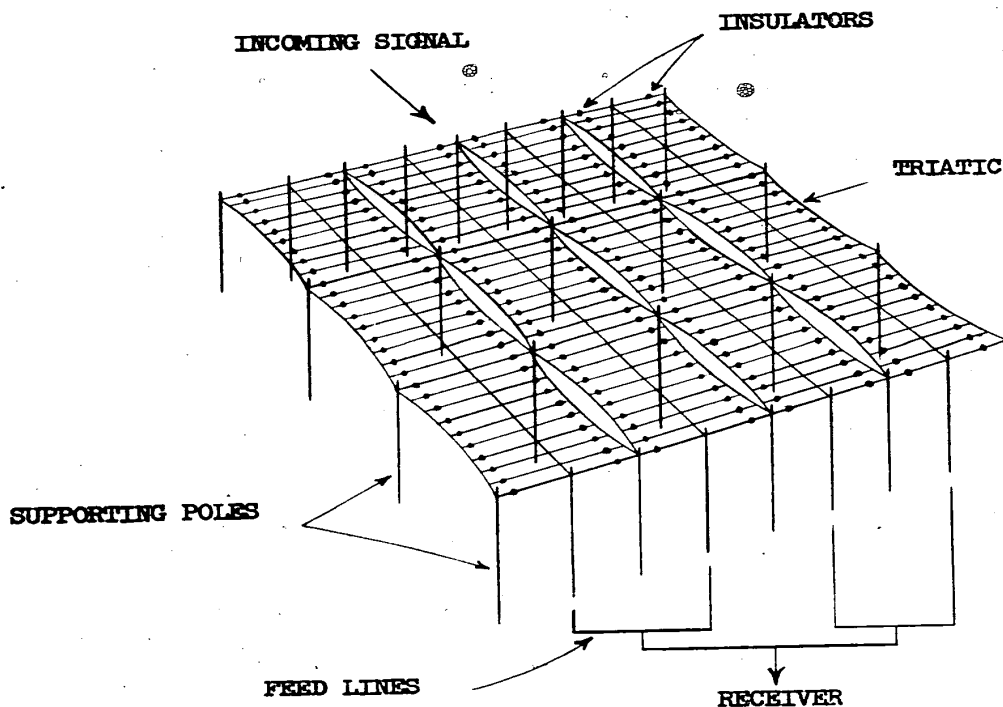
FOUR-BAY FISHBONE ANTENNA

Fig. 2.

The "fishbone" antenna is a high-frequency receiving antenna and is a special form of a travelling wave antenna. It consists of a series of dipoles arranged in collinear pairs, loosely coupled to a transmission line at equal intervals by small capacitances. The transmission line runs horizontally in the direction of the incoming signal. The dipole elements are short enough to be non-resonant within the frequency range of the array and are spaced near enough together to provide a uniform loading of the transmission line. The dipoles are capacitively coupled to the transmission line to keep the propagation velocity of the line above ninety percent of free space. The end of the transmission line toward the transmitting station is terminated in a non-inductive resistance equal to the characteristic impedance of the line, which is about 400 ohms.

Next 2 Page(s) In Document Exempt